§ 320. **The Botanical Text Book, Sixth Edition.** *Part I., Structural Botany, or Organography on the Basis of Morphology. To which is added the Principles of Taxonomy and Phytography, and a Glossary of Botanical Terms*, by Asa Gray, LL.D., &c. Ivison, Blakeman, Taylor & Co., New York and Chicago.—We think it must have been Gray's *Elements of Botany*, published about 1836, which gave us our first insight into the science. We well recall the delight with which we read the clear elucidation of the subject—delight in the method, for we had no particular experience in the matter. This clear method, the presentation of Structural Botany on the basis of Morphology, has been continued and improved upon in all the successive editions of the Text Book, the first of which was published in 1842, and the fifth so long ago as 1857. So great has been the growth of the science in the interim, that it has been found advisable to divide the sixth edition into four volumes, of which the present, on *The Structural and Morphological Botany of Phaenogamous Plants*, properly appears first, and will undoubtedly for years to come be the main text book on the science in our colleges and scientific schools, containing as it does the latest results in this department, treated with a mastery and a clearness of which we know no equal. The second volume, on *Physiological Botany* (*Vegetable Histology and Physiology*), is assigned to Prof. Goodale. The third volume, the *Introduction to Cryptogamic Botany, both Structural and Systematic*, will be the work of Prof. Farlow. A fourth volume, a *Sketch of the Natural Orders of Phaenogamous Plants, and of their special Morphology, Classification, Distribution, Products, &c.*, will be needed to complete the series; this we earnestly hope that Dr. Gray will live to accomplish. We may then learn his final views as to the vexed questions in the arrangement of the natural orders. At present he gives a general but decided recommendation to that of Bentham & Hooker. Of Dr. Gray's great services to the Science, a most significant one is that he has been able to gather about him, to share and carry on his work, men like Watson, Goodale and Farlow.

The present edition has been entirely re-written, and as there is no want of elementary works, this is intended to serve as a text book for the higher and complete instruction. The relegation of the physiology, &c., to the other parts has left room for the fuller treatment in this of those morphological points which in late years have received the greatest development. The volume contains 442 pp. against 555 in the 5th edition, and 314 against 350 in the chapters relating properly to structural botany. Dr. Gray's writings are noted for the proper and strict application of terms, of which many additional examples are here to be found. An interesting feature are the foot notes referring to the literature of the more important additions and often to the history of a technical term.

Of the eight chapters, Chap. V., on *Anthotaxy*, and Chap., VI., on the *Flower*, are the fullest of new and weighty matter, containing the discussion of the latest investigations, notably of Eichler in his

Blüthendiagramme. The account of the various kinds of inflorescence in Chap. V. elucidates a very difficult subject. In the doctrine of the flower, Chap. VI., it is stated that "extended observation leads to the conclusion that the typical flower in nature has two series in the perianth, or is *Diplosteminous*, the stamen circles alternating respectively with calyx and corolla. The terms *Antisepalous* and *Antipetalous* proposed for such stamens are so much better than *episepalous* and *epipetalous* that we may reasonably look for their general adoption. This chapter is full of interesting discussions of different points in floral irregularity, and of the adaptations for fertilization.

Chapter IX., *Taxonomy*, treats first of the vegetable individual and secondly of the idea of species. In regard to the former, the conclusion is: "Upon the view here adopted, that plants do not rise high enough in the scale of being to reach true individuality, the question is not whether it is the cell, the phytomer, the shoot, the tree, or the whole vegetative product of a seed which answers to the animal individual, but only which is most analogous to it. In our view, its analogue is the cell in the lowest grades of vegetable life, the phytomer [plant part=node] in the higher. But, in botanical description and classification, by the individual is meant the herb, shrub, or tree, unless otherwise specified."

As the elusive idea of species underlies the whole question of classification and evolution, we shall endeavor to present Dr. Gray's views, though probably our disconnected quotation may fail to do him justice. He says: "Among the many definitions, that of A. L. Jussieu is one of the briefest and best, since it expresses the fundamental conception of a species, *i. e.*, the perennial succession of similar individuals perpetuated by generation." "The two elements of species are: 1. Community of origin; and 2. Similarity of the component individuals. But the degree of similarity is variable, and the fact of genetic relationship can seldom be established by observation or historical evidence. It is from the likeness that the naturalist ordinarily decides that such and such individuals belong to one species. Still the likeness is a consequence of the genetic relationship; so that the latter is the real foundation of species." p. 317. Speaking of Subspecies: "We judge them not to be so many species, either, because in the case of cultivated races we know something of their origin or history, and more of the grave changes which long domestication may bring to pass; or because the forms, however stable, differ among themselves less than recognized species generally do; or because very striking differences in the extremes are connected by intermediate forms. And our conclusions, it must be understood, are not facts, but judgments, and largely fallible judgments. For while some varieties appear strikingly different, some species are very much alike." p. 320. Referring to the remarkable reversion of the hybrids of Datura: "There appears, therefore, to be a real ground in nature for species, notwithstanding the difficulty and impossibility in many cases of defining and limiting them." p. 322. "All plants of the same species are so much alike that they are inferred to have descended from a common stock, and their dif-

ferences, however grave, are supposed to have arisen from subsequent variation, and the more marked differences to have become fixed through *heredity. This is included in the idea of species.* Descent from a common stock explains the likeness, and is the only explanation of it," p. 328, the italics are ours. "Doubtless if variation, such as botanists have to recognize within the species, be assumed as equally or even more operative through long antecedent periods, this would account for the diversification of an original species of a genus into several or many forms as different as those which we recognize as species. But this would not account for the limitation of species, which is the usual (but not universal) characteristic, and is *an essential part of the idea of species*," ibid. We find here some obscurity; the italics again are ours. Just this is accounted for by the *Survival of the Fittest* in the *Struggle for Life.* "Thus an ancestral type would become diversified into races and species. Earlier variation under terrestrial changes and vicissitudes, prolonged and various in geological times since the appearance of the main types of vegetation, and the attendant extinctions, are held to account for genera, tribes, orders, &c., and to explain their actual affinities. Affinity under this view is consanguinity; and classification, so far as it is natural, expresses real relationship. Classes, Orders, Tribes, &c., are the earlier or main and successful branches of the genealogical tree, genera are later branches, *species the latest definitely developed ramifications, varieties the developing buds.*" p. 329. The italics ours. Add to this the note on page 319, where, differing from Darwin, Dr. Gray says: "Naegeli, Brown and myself incline to the opinion that each plant has an inherent tendency to variation in certain general directions," and we have a tolerably complete presentation of his views on this subject.

The logician sometimes complains, when he finds, on analyzing a plant, that the description differs somewhat from the specimen before him. We have so often met with these objections, that we are glad to put the answer in Dr. Gray's words, which are apposite for this purpose, though having a more general intention. "The naturalist's groups, of whatever grade, are not *realities*, but ideas. Their consideration involves questions, not of *things*, between which absolute distinction might be drawn, but of *degrees of resemblance*, which may be expected to present infinite gradations."

After discussing these questions, the chapter gives a particular account of the Linnaean classification, and a more general one of the Ante-Linnaean, and of the more noted Natural Systems.

Chap. X., *Phytography*, gives rules for the description and naming of plants. Then follow directions for the collection, preservation, and examination of specimens. This may be called the Practical Chapter of the book, and will prove one of the most interesting to the working botanist. We have never met with so complete information on all points which a student who wishes to study, describe, or preserve his specimens, or to correspond with other botanists, wants to know about. To the section on Herborization Mr. Hoysradt contributes an abstract or new edition of his valuable notes, which

have from time to time appeared in the BULLETIN. At the close, the chapter treats of herbarium cases, with a recommendation of the small and inexpensive cabinets proposed and illustrated by Dr. Parry in the American Naturalist, VIII, 471.

We have next a much needed table of the usual abbreviations of the names of botanists and botanical authors, and of the other abbreviations and signs used in botanical works.

Finally, the Glossary or Dictionary of botanical terms, English and Latin, is much enlarged. We find here, for example, the adjective "*brunneus*, deep brown," for which we have searched the Latin lexicon in vain. The Index part is a reference, at the end of a definition, to the page where the term has been introduced. Nevertheless, we feel the want of a separate index, for the attempt to combine the two is apt to lead to oversights and omissions; vide *polembryony* or *polyembryony*, for an oversight, and *antidromy*, for an omission, perhaps intentional, but the word as it is used, p. 157, it is entitled to a place in the glossary.

The generally excellent illustrations have been retained as far as possible, perhaps unnecessarily so in Fig. 221, and many new ones have been added. We have noticed but few typographical errors, such as are common to a first impression of a text book, and these chiefly in the numbers referring to the figures. On page 281, Fig. 576, 578 occur repeatedly for Fig. 579, 581.

There are several expresssions in the course of the volume implying the author's satisfaction or dissatisfaction with his formerly published views, which will be regarded with peculiar interest by those who have long regarded Dr. Gray as their great teacher and model.

In the Utica *Morning Herald*, of June 26th, is published the *Plant Exiles*, the annual poem read before the Society of Hamilton Alumni, by Benjamin D. Gilbert, of Utica—a pleasing tribute to the illustrious botanist who

> "——sprang from the hills that rise in the midst of Oneida."
> "—— the teacher whose genius translated the tale of the Glaciers,
> Read in the levaes of the plants the runes that within them lay."

§ 321. **Notes from Prof. I. H. Hall.**— A few days since, on a short trip to Western New York, I visited some familiar localities to see how things were growing, and noticed that the thinning out of some damp woods had greatly increased the number of seedlings of Sanguinaria. I presume that others, like myself, have often seen seedlings of this plant, and noticed how the very young leaves are almost always round-reniform. I have had this plant in cultivation, to which it takes very kindly, and in so doing becomes highly ornamental; and I have noticed that it readily multiplies from the seed. It is worth extended domestication; and it does not depend very much upon shade for thriftiness.

I also saw that the Onoclea in several localities was very much given to sporting; that is, to putting forth fronds that were midway between the shapes of the sterile and fertile normal shapes; and of course all the erratic forms were more or less fertile, as far as could be inferred from the present green stage. No one who is accustomed